

Automatic Guidance System for Office/High rise buildings

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Abstract:

When a person enters into a building or office he may not know the way to reach his/her required place. In that situation, he/she needs to ask other persons to find the way to reach his destination and it may consume some time. This work explains how the automatic guidance system helps the person to find his own way easily without asking anyone. The automatic guidance system can guide the person in such a way that when a person enters into a building, sensor will detect the motion of that person. This sensor may be PIR (Passive Infra-Red) sensor or RFID (Radio Frequency Identification) or an Object sensor. The sensor detects the object and sends a signal to the controller kit through Zigbee or Wi-Fi. The controller is basically a tiny microcontroller 8051/8952 or AVR (Alf and Vegard's RISC) which is programmed to execute the required operation at a required time. The guidance can be path defining in day/night conditions by an indication as a buzzer/ light illumination with the help of LED display.

Keywords — Sensor, Microcontroller, Battery, Zigbee, LED display.

I. Introduction

The automatic guidance systems are already existed in several fields like agricultural field machinery, form tractor, industry, docking systems etc. In the existed system indicate the directions. In this proposed system all the components are connected to power supply. Low power consumption is one of the objective of this proposed work.

For power consumption we can connect a battery or SMPS (Switch Mode Power Supply). The battery may be a 9V battery which has trustworthiness up to one year. For long period trustworthiness we can use SMPS. But this SMPS can be used only at the power points present in the building. Another substitute is renewable energy source like solar power supply can be made

the automatic guidance is used to know the field conditions and to find the position of agricultural vehicle. But in the proposed system the automatic guidance is used to

use of, depending upon the convenience and cost effectiveness.

AVR is a family of microcontrollers industrialized by Atmel started in 1996. These are reformed Hardware architecture, 8-bit RISC single-chip microcontrollers. It was one of the first microcontroller families to use on-chip flash memory which is used for program storage, as unlike from one-time programmable ROM, EPROM, or EEPROM used by other microcontrollers at the time. The AVR is programmed in such a way that when it collects the signal from the detector, the LEDs (Light Emitting Diodes)

which are connected to the kit will display the output i.e., way to laboratories or office room or departments or library etc., If no person enters into the building then there is no sensor recognition and there by no LED display. Due to this we can save the power and reduce the power consumption.

Zigbee technology is used for this project. Zigbee is an IEEE 802.15.4 based requisite for an outfit of high-level communication protocols. It can be used to create personal area networks with minor, low-power digital radios, such as for home computerization, therapeutic device data collection, and other low power low-bandwidth needs. It is designed for small scale projects which require wireless connection. Therefore, we can say that zigbee is a low-power, low data rate, and close vicinity (i.e., personal area) wireless and hoc networks.

We can use LCD (Liquid Crystal Display) board to show the output. But LCD screen is costlier than LED screen. So we are using LED display. These LED boards can be placed at every turning point. After a person leaving a path it will automatically switch-off within one or two minutes.

This system can be used anywhere like Offices, High-rise buildings such as colleges, shopping malls, multi-specialty hospitals, etc. Hence the proposed system is made automated guidance to locate person's destination.

Automatic guidance systems are already have several applications such as agricultural field machinery, farm tractor, industry, docking systems etc., The application here is to guide the people in a new building by indicating different ways to different places in that building.

II. Literature survey

The focal elements of automatic guidance system used in farm tractor are sensors for gathering data from reference positions, a signal conditioner is used for transforming the signal to appropriate form, a controller is

used for processing the data to guide a vehicle and actuators are used for navigation. Now a days microcomputers have been extensively used as controllers in automatic guidance systems because of the high-tech developments in electronics. A microcomputer is used by Tennes and Murphy to detect the adjacent position errors from sensors straddling on the tractor, to determine the steering angle and to navigate the tractor using hydraulic steering system.

A field map may be a useful tool for automatic control and this field map can be designed by a guidance system. This guidance system need a general spatial position sensing system that can identify the position of the machine at any time. A computer can generate digitalized maps of territory and crop with the help of suitable sensor technology and a position sensing system. The system is crucial for controlling the specific application to achieve the sought after tillage results. Automatic controls use such information to direct the tractor to keep an eye on the same tracks repeatedly. This system could also make it possible to optimize the behavior applied to each field area rather than considering the entire field the same. This mapping system can be used to fertilize the field and plant a crop in each field area according to its harvest potential, and to sprig each area with a recommended mixture and rate of herbicide or insecticide. The accuracy requisite from position sensing system to improve the field maps for these operations may not be as precarious as that needed for automatic guidance.

There is a necessity for automatic control of agricultural machinery systems to rise productivity of field operation for a long time. An automatic guidance system for agricultural vehicles should be trustworthy, stretchy, adaptable, tranquil to maintain, simple to operate and reasonably priced. There are several types of guidance systems

have been designed for tractors, combines, and apple harvesters, only some of them have fulfilled those requirements.

Automatic guidance is also used in docking systems. Higher gate efficiency and greater throughput is demanded by the increased passenger traffic. To dock planes efficiently and to optimize the airport gate capacity Honeywell's Advanced Visual Docking Guidance System (A-VDGS) is used. Honeywell A-VDGS is constructed on electronic imaging technology – the eye-like High Dynamic Range CMOS (HDRC) camera. Due to high and persistent contrast perseverance in both bright and dark regions of scene, the power of human optical observation deceits in its high dynamic range and vigorous thing (object) detection. HDRC captures MAXimum imaGe Information Contents (MAGIC) with the greatest operational use of bits per pixel because HDRC contains high dynamic range, great tenacity, high speed and logarithmic compression per pixels

III. Proposed system

The proposed automatic guidance system comprises power supply, sensor, micro controller, zigbee and LED display to give the automatic guidance.

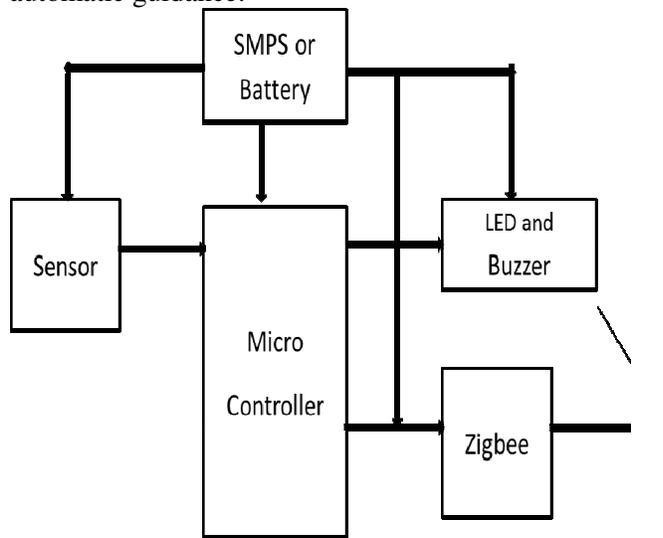


FIGURE-1: Block diagram of Automatic Guidance System

A. Power supply

In the above block diagram we can see that all components are connected to the power supply unit (which is nothing but a battery or switch mode power supply) because power supply is necessary to work each component properly.

When AC power is given to the kit then it is converted into DC power with the help of components present in the kit. First the AC power is given to bridge rectifier. Bridge rectifier gives the pulsating DC as output. So it is given to the capacitive filter to eliminate AC components in the given signal and then it is given to the +5V voltage regulator to get constant output voltage.

B. Sensor

Sensor is used to detect the object in its detection range. The working of sensor is, it sends signal in all directions continuously. If any signal returns to sensor then it will be the indication of object detection because when the signal touches an object then that signal reflects back to the sensor. There are different types of sensors like Object sensor, motion sensor, RFID Sensor, PIR sensor etc., The minimum detectable range of a sensor is up to 6 meters. The Insulation resistance of a sensor is 20 MΩ. The optimum temperature range is from 0 degree centigrade to 40 degree centigrade and the optimum humidity range is 35% to 85%. After sensing the signal the sensor has to send that signal to the microcontroller.

C. Micro controller

The microcontroller used here is AVR and it stands for "Atmel and Vegards Risc". The AVR has several features like on-chip flash memory, internal data EEPROM up to 4KB, 16KB of internal SRAM and externally it contains 64KB of memory. AVR also has multiple power saving sleep modes. AVR also consists of 10 or 12-bit analog to digital converters. It can multiplex up to 16 channels and it also consists of 12-bit digital to analog converters. 8-bit and 16-bit timers are present in AVR. Watch dog timer is also

present in AVR for resetting purpose. AVR also consists of several serial interfaces like I²C. It stands for interconnect integrated circuit and it is a compatible two-wire interface, Synchronous/Asynchronous serial peripherals (UART/USART) which are used with RS-232, RS-485, Serial peripheral interface bus (SPI) for data transfer, and it also support Universal serial interface (USI). AVR can support CAN controller and it can have USB controller support like proper full-speed (12Mbps) and also freely available low speed (1.5Mbps), Ethernet controller support, LCD controller support etc.,

D. Zigbee

Zigbee is a wireless technology used for small scale projects instead of Wi-Fi because the power consumption of Zigbee is one fourth of Wi-Fi. The physical range of zigbee is 10-30 meters. The operating frequency of zigbee is 2.4GHz and the channel bandwidth is 1MHz. Data rate of zigbee is from 20Kbps to 250Kbps and the bit time is about 4 micro seconds. Zigbee contains a coordinator for observing the signals, end router to provide path for data packets and end device. The network

size of zigbee is 65000 nodes in one network. The Advanced Encryption Security (AES) methods for encryption and CCB-CCM methods are used for network security purpose.

The flow chart related to this automatic guidance system is as follows.

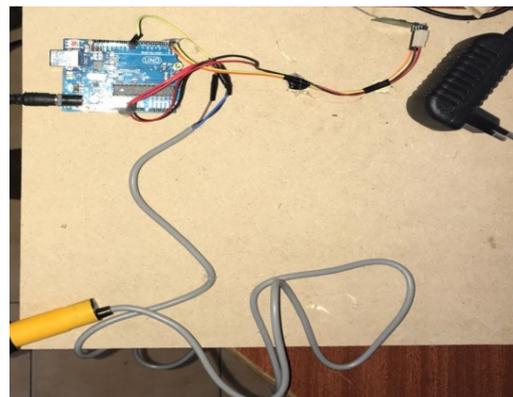
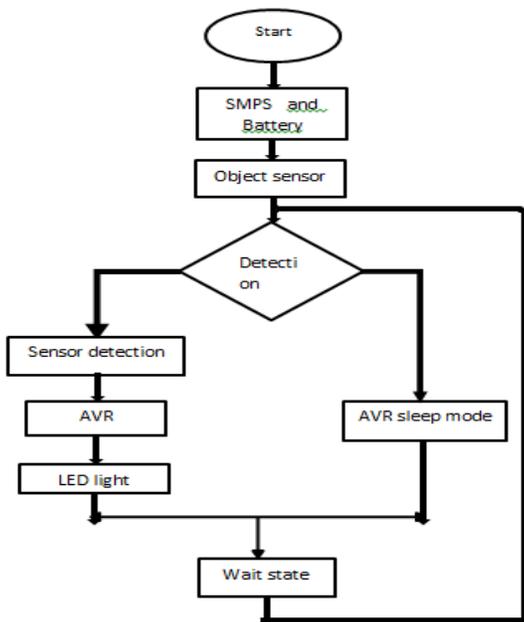
FIGURE-2: Flow chart

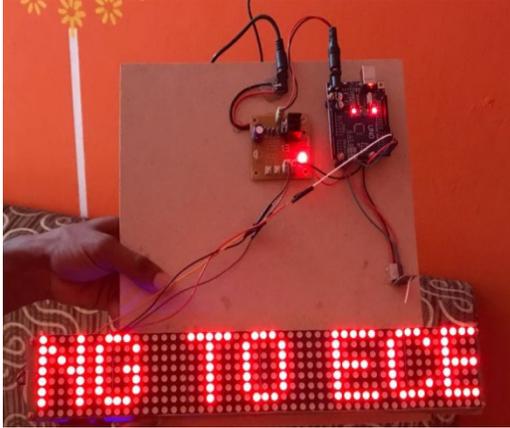
E. LED display

The LED display boards are used here to indicate the directions for different places in a building complex. These display boards can be placed at corners of the building. Also a buzzer can be used to indicate the directions with its beep sound.

The flow chart shows that when a person enters into a building the sensor detect that person and sends a signal to the microcontroller. The microcontroller is programmed in such a way that when it receives the signal from sensor, the controller has to execute the program and display the output on LED board. If no detection takes place then all components will go to wait state and microcontroller will go to sleep mode. All components comes to active state when detection takes place.

IV. Results





V. Conclusion

The automatic guidance systems in existed systems like form tractor, agricultural field machinery, industry, docking systems are not used to indicate directions. But in proposed work the automatic guidance system is used to indicate the directions in day/night conditions with the help of LED display board. It can be used anywhere like building complexes, shopping malls, multi-specialty hospitals, railway stations, airports etc.,

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